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THE JOURNAL OF PHILOSOPHY

CAUSALITY AND NECESSITY

EMPIRICISM is customarily thought to deny that the idea of necessity can have empirical content or application. In what follows, however, I shall argue that an adequate empirical metaphysics will include and make use of an empirical idea of causal necessity.

Metaphysics is concerned with the intelligible structure which our best knowledge ascribes to existence. For empiricism our best knowledge is inductive. Accordingly, an adequate empirical metaphysics must afford a comprehensive view of inductively discoverable intelligible structure. And if causal necessity is an essential ingredient in intelligible structure, then an adequate empirical metaphysics must take account of it.[1]

1. *Causal connection makes explanation possible.* Intelligible structure is revealed in explanation. This means that causality and explanation are closely bound. For if we understand the term "causal" in a sufficiently broad way—in correlation with the term "because"—what makes explanation possible is causal connection.

A fact is explained when other facts are exhibited by which it is determined as effect. Explanation involves two kinds of elements: (1) conditions, or facts determining the effect, and (2) principles of determination (laws, for example), which state the connection according to which the conditions determine the effect. For instance, in the explanation "This wire conducts electricity because it is made of copper and copper conducts," the fact that the wire is made of copper is a condition, the law that copper conducts is a principle of determination, and the fact that this wire conducts is explained, as resultant effect, by the combination of condition and principle. We may correspondingly distinguish two relations. (1) The first is that of "explaining." The *combination* of principle and conditions *explains* the effect. (2) The second we may broadly call "causal"; it holds between conditions and effect, and is specified in the principle. The conditions *cause*

[1] For a discussion of the conception of metaphysics behind these remarks see the writer's article "A Conception of Empirical Metaphysics," this JOURNAL, Vol. XLV (1948), pp. 421–435.

the effect, in accordance with the principle. E.g., whereas the fact that this wire conducts is *explained* by its being made of copper and copper's conductivity, it is *caused* by its being made of copper. Unless there is a relation of type (2), which is specifiable in a principle and for which reason we think of the latter as a principle of determination, there will not be a relation of type (1), i.e., there will be no explanation of a fact as effect.

But the notion of causal connection should be taken with sufficient breadth so as not to exclude by definition possible modes of explanation. For instance, the Hume-Mill regularity theory of causality requires that the causal conditions of an event precede it in time. If this view were correct, then explanation of the past by reference to the present or future would be excluded as impossible by definition. Since one of the important problems of metaphysics, however, is precisely the question whether prior events are determined by posterior events, it would be an error of method to rule out one possibility antecedently to inquiry. We ought, therefore, to conceive of causal connection so broadly that, given an inference by which a conclusion is *explained,* we shall consider the principle employed as asserting a causal relation. This makes causal connection coextensive with possibility of explanation. It seems the only way that allows us to take all aspects into account.

2. *Causal connection involves a certain kind of necessity, which may be called "real necessity."* In order to establish this point it is necessary to consider the problem of the meaning of a causal law. It will be sufficient here to examine the question in connection with the relation of implication, leaving aside other operations such as negation, disjunction, or equivalence.

Causal implication is not logical implication; the cause does not logically necessitate the effect. A causal implication must be synthetic and its evidence must be empirical. Moreover, causal implication can not be simply identified with what is called formal implication (universal material implication). For a formal implication can be true for causally irrelevant reasons. E.g., if a true formal implication were a causal law, then it would be a law that all twenty-foot men are blond and also that all twenty-foot men are brunette. This violates the idea of causal law, which requires that determinate causes have determinate effects.

There seem, therefore, to be two possibilities. (1) Causal implication may be a *species* of formal implication. It would then have to satisfy certain additional requirements, namely, those necessary and sufficient to narrow down the genus "formal implication" to the species "causal implication." (2) Causal implica-

tion may not be a species of formal implication. It may, if it involves necessity, be a form of modal implication.

The first alternative has been adopted recently by some analysts.[2] There is not sufficient space available here to give their procedure the attention it deserves. I shall therefore go on directly to state why, in my opinion, causal implication *can not* be a species of formal implication. The reason is that, *whereas a causal law tells us which are and which are not the real possibilities, a formal implication states a distribution of the actualities.*

Take as an example the old standby "All men are mortal." (By "men" is meant entities with human characteristics, so that no reference need be made to habitation on earth or any other such particular.) If formulated as a formal implication it does not state a causal relation. For suppose that under certain conditions a man might live forever. Would this supposition be compatible with the truth of the formal implication? If so, and if we nevertheless maintain that the formal implication states a causal law, then we are in the position of affirming that there can be a real possibility of violation of a causal law. This, however, is contrary to the idea of causal law. What violates causal law is *really impossible.*

Now the real possibility of an immortal man *is* compatible with the truth of the formal implication "For all x, x is human (materially) implies x is mortal." It is logically possible that (1) every actual (past, present, future) case of a human being is also a case of a mortal being, and yet (2) the nature of the actual universe is such as to allow the possibility of a human being who is also immortal. It is sufficient to establish (1) in order to establish the formal implication. But this is not sufficient to deny (2). And since (2) is not denied by the formal implication, the latter can not express a causal meaning.

"All men are mortal," as a causal law, tells us that, in some sense, there can not be an immortal man; but as a formal implication it tells us that any actual entity either is not a man or is mortal, and perhaps both. Thus there is an essential difference between the kind of fact asserted by a formal implication and that asserted by a causal statement, namely, the difference between a fact of actual distribution of cases and a fact of real possibility

[2] See, for example, H. Reichenbach, *Elements of Symbolic Logic*, Macmillan, New York, 1947, Chapter VIII; C. G. Hempel and P. Oppenheim, "Studies in the Logic of Explanation," *Philosophy of Science*, Vol. 15 (1948), esp. pp. 152–157; Nelson Goodman, "The Problem of Counterfactual Conditionals," this JOURNAL, Vol. 44 (1947), pp. 113–128.

and impossibility.[3] A formal implication states an actual uniformity and does not intend to deny the real possibility, but only the actual occurrence, of a counterinstance. But the denial of real possibility, in positive form, constitutes the element of necessity in causal law.

A formal implication can not function as a principle of determination in an explanation. We would not consider it an explanation of the fact that someone is mortal to say that he is human and that every actual human is mortal. For if there can really be, even though there actually is not, a human who is not mortal, humanness can not afford a reason for mortality. The law employed in explanation must have causal meaning, and hence must assert a real necessity.

3. *How Hume's Paradox is to be answered.* Although Hume recognized that causal law involves a form of necessity,[4] he was driven by the presuppositions of his analysis to identify this necessity with a determination of the mind (imagination) "to make a transition from the idea of one object to that of its usual attendant, and from the impression of one to a more lively idea of the other."[5] Consequently he was forced to the position that causal necessity is essentially subjective,[6] although he was unable to shake off the feeling that there was something more to the matter, pertaining to the objects themselves. He was sensible that the subjectivizing of causal necessity was the most violent *paradox* in his entire doctrine, that it runs counter to the inveterate prejudices of mankind, and that it will be admitted only by dint of solid proof and reasoning.[7] The definitions of "cause" which he offers are open to the objection, he is aware, that they are drawn from circumstances foreign to the cause,[8] yet his analysis requires him to say that "we cannot remedy this inconvenience, or

[3] As C. I. Lewis says, "A generalization whose significance is confined to *actual cases* cannot cover the intended meaning of a terminating judgment [or, as I should say more generally, a causal judgment], because that meaning requires that a hypothesis should still have significant consequences (and not every conceivable consequence) when it is contrary to fact," *An Analysis of Knowledge and Valuation*, Open Court, La Salle, Illinois, 1946, p. 220. Now the only way in which a generalization can relate a hypothesis to consequences specifically in all cases, not only in those in which the hypothesis is true, is to assert something about all the logically possible cases, not merely about all the actual cases. *It must say which of the logically possible cases are actually or really possible and which are not.*

[4] *Treatise*, III, ii.

[5] *Treatise*, III, xiv.

[6] *Ibid.*

[7] *Ibid.*

[8] *Ibid.*

attain any more perfect definition, which may point out that circumstance in the cause which gives it a connexion with its effect. We have no idea of this connexion; nor even any distinct notion what it is we desire to know, when we endeavour at a conception of it."[9]

Hume's doctrine that experience and analytical reason can not provide an objectively valid conception of causal necessity was the most influential factor leading Kant to invent the theory of a synthetic *a priori* categorial structure of mind, substituting a rigid mental mold for Hume's softer mental habit as a foundation for the coherence and intelligibility of the experienced world. Out of Kant there arose several of the varied modern versions of causality, e.g., the objectivizing of mind and its categorial structure by the Hegelians and the methodologizing of it by the instrumentalists, none of which overcomes Hume's Paradox unless by introducing one equally violent. The attempt to return to a pre-Humian conception, according to which we have direct experience of causal relation, as in the experience of activity (James, Bergson) or of continuity of feeling and meaning (Whitehead), is open to the charge that necessity, a modal relation, is not a matter of direct sense or feeling, and that one ought not to confuse a quality of feeling which arises on the occasion of a causal transaction with the structure of necessity that makes it a causal transaction, any more than one ought to confuse the sense datum presented by a red object with the physical constitution of the object which appears as looking red to us.

If there is an answer to Hume's Paradox, it is necessary first to point out the invalidity of the reasons which forced him to subjectivize the causal relation and then to indicate the positive character of that idea of necessity which he doubted was possible.

His first error consisted in supposing that we have no idea that is not derived from an impression, where the notion of derivation is primarily conceived as a matter of copying. This is a crude empirical theory of meaning, insufficient to accommodate the meanings essential to empirical science. Thus, on this theory, the idea of energy would be impossible as an objective concept, since we have no direct perception of energy. Empirical philosophy needs a more adequate view than this, for instance one such as that stated by Professor Reichenbach: "First principle of the probability theory of meaning: a proposition has meaning if it is possible to determine a weight, i.e., a degree of probability, for the proposition."[10] Thus, if a proposition asserting a neces-

[9] *Enquiry*, VII, ii.

[10] *Experience and Prediction*, University of Chicago Press, Chicago, 1938, p. 54.

sary connection can have ascribed to it a degree of probability on the basis of observational evidence, it should be taken as empirically meaningful and the concept of necessity involved in it as empirically applicable.

If one looks for a direct impression of an objective relation from which to copy an idea of necessity, one can not find it. One can find experiences of appropriateness, belonging together, mutual fitness, of the sort which gestalt theoreticians and phenomenologically-minded philosophers have sometimes attempted to connect with the causal relation. But such experiences clearly can not serve to verify judgments concerning causal connections. One does not empirically confirm the law of the lever by discovering that one experiences a fitness or a "compulsion" in the directly experienced content of one arm ascending and the other descending when unequal weights are placed on the pans of a balance. Hume, looking for an impression to copy, found it in the feeling of compulsion by which the mind is affected when dealing with two partners of a uniformity. This shows how one may get to have an image of a feeling of compulsion, but not how one may find objective grounds for a judgment of necessity.

Hume's second error consisted in tending to treat induction genetically rather than logically. He was primarily concerned with how we get the idea of causal necessity. Accordingly the major use to which he puts the frequent repetition of the conjunction of cause and effect is that of psychologically inducing a habit of expectation, i.e., of being a *cause* of belief. But the significant question is whether this frequent conjunction is able to serve as *evidence* for a judgment of necessity. That is, it concerns not the psychological effect of the frequency on the mind but its logical relation to the causal judgment.

The answer to Hume's Paradox, then, consists in showing that there is an idea of real necessity which is inductively related to observational evidence.

4. *Real necessity is definable by reference to allowable logical possibility, and it does not involve logical or intuitive certainty.* Consider two properties, S and P. Then for an individual, a, there are four logical possibilities with respect to its possession of S, P, and their negatives:

(1) the possibility that a is both S and P,
(2) the possibility that a is S but not P,
(3) the possibility that a is not S but is P,
(4) the possibility that a is neither S nor P.

By "the possibility that *a* is both *S* and *P*" I mean to refer to what is meant or designated by the sentence "It is logically possible that *a* is both *S* and *P*." So long as the sentence "*a* is both *S* and *P*" is not contradictory, the sentence "It is logically possible that *a* is both *S* and *P*" is analytic. In the usual language of the logical empiricists, it does not express a "fact," says nothing about the world. I should prefer to say, it says nothing synthetic about the world, leaving open the question of the nature and reference of analytic propositions or logical truths in general. In any event it is logically true. It requires none but logical principles for its establishment.

There will be such sets of four possibilities for every individual. Hence we can conceive of the class of all such logical possibilities. Moreover we are able to make selections, *arbitrarily if necessary*, from this class. For instance, we may select cases (1), (3), and (4) for every individual, forming a subset which contains three out of every four possibilities in the original set. The remainder, containing all the cases (2), will constitute the complementary subset.

Now if we wish to exclude a logical possibility from the status of being a real possibility, we can not do it by denying that it is a *logical* possibility. Thus if we say "It is not possible that *a* is *S* but not *P*," and if we mean that this is not *logically* possible, then we shall have asserted a contradiction. For the logical possibility can be established analytically. To remove a logical possibility from the status of being a real possibility, we must say that, while it remains a logical possibility, it is not *allowed* in some real or existential sense. Thus in the case of a universal law, we should say that the subject of which we are speaking—here, the actual universe considered as the class or whole of all actual individuals—is such as not to allow the logical possibility as one of the possibilities pertaining to, or available to, it. So far as logical principles are concerned, there are four possibilities. So far as the world is concerned, there are only three. We may therefore distinguish between *allowable* (or *available*) and *not-allowable* (or *not-available*) logical possibilities. The first subset, containing all cases of the type of (1), (3), (4), is the set of allowable logical possibilities pertaining to the universe, if the causal law "All *S* is *P*" is true. The remaining subset contains the not-allowable possibilities.

The notion of an allowable or available possibility is the root form of the idea of real possibility. The more usual notion says that a proposition represents a real possibility if it does not contradict a law of nature. But this presupposes that one already

knows what is a law of nature, whereas the essence of the problem lies precisely in determining what is a law of nature. We need the idea of real possibility to define the idea of a law of nature, not conversely. It is a necessary condition for a proposition to state a law of nature that it be a true universal proposition which excludes some class of logical possibilities of instances of combinations of its predicates as not-allowable with respect to the actual universe.

Connected with this notion of real possibility (allowable logical possibility with respect to a subject) is the notion of real necessity. If the only real possibilities with respect to instances are, e.g., (1), (3), and (4), it follows that the only real possibility in which something is S is one in which it is also P (case [1]). There is no other real possibility in which something is S. Thus we say that this situation necessitates P, given S. This is the sense of real necessity which is incorporated in causal law as the foundation of a relation of determination.

Consider a quasi-geometrical representation of these notions. In thinking of any given subject, we can conceive of the various logical possibilities with respect to it. These may be imagined as constituting a "logical space" of all possible "positions" of the subject. When we select a subset of the logical possibilities as allowable or real possibilities, it is as though we are drawing a figure in the logical space. This figure represents not only the possibilities that *are* realized, but the whole set of possibilities *allowed* for realization. In general, only some of the real possibilities will be realized. The rest remain real but unrealized possibilities. The remainder of the space outside the figure contains logical but not real possibilities, which are neither realized nor available for realization.

This representation is not merely figurative. Analytical mathematical functional relations, such as are used in empirical science, afford exact illustrations. Consider a proposition which ascribes a given elastic constant to a given material. If the elastic constant is k, then Hooke's law, with the value k, applies to the material: Stress $= k \times$ Strain. There is an infinite set of logically possible numerical values of stress, and equally of strain, and there is consequently an infinite set of logically possible pairs of stress-strain values. In a graph of the equation this set of pairs is indicated by the set of all points on a plane. But the equation selects from all logically possible pairs a subset, consisting of those and only those which satisfy the equation. These are the logically possible pairs allowable to any object consisting of the material.

In the graph they are indicated by a line. The pairs corresponding to points on the line are the really possible pairs.

The equation does not assert that any particular pair will actually occur. Its function is to restrict the domain of logically possible pairs to those that are allowable or really possible. The sentence "The elastic constant of such-and-such material is k" thus operates as a single formula stating in brief compass which are, and which are not, the allowable logically possible combinations. This is why it is thought to state a *causal* fact about the material.

It is important to observe a certain feature of the species of necessity (real necessity) which depends on the contrast of allowable and not-allowable possibilities. The exclusion of certain logical possibilities as not-allowable is not a *logical* exclusion. We are not told that, e.g., the possibility of a's being S but not P is not-allowable by logical principles alone. It follows that real necessity does not have the force of logical necessity. It depends on something other than logic alone. The assertion of it is *synthetic.*

On the other hand, the assertion of a real necessity is not bound up with any sense of *intuitive certainty.* There is nothing in the notion of real necessity, as outlined here, to suggest that the mind is irresistibly compelled, when it conceives or intuits the terms between which the necessity is assigned, to assent because of the evidential value of the conception or intuition. Thus the assertion of real necessity has neither the certainty of logical tautology nor of self-evident truth.

The question of the nature of the evidence for an assertion of real necessity differs from the question of the nature of the assertion. We assert real necessity by asserting that of all the possibilities which logic allows with respect to a given subject, only some of these possibilities are allowed as actually pertaining to the subject. Of whatever sort the evidence may be which will confer upon this assertion some degree of probability, the assertion involves this kind of delimitation, with reference to a subject, of the logical possibilities open to it. There is nothing in the nature of the assertion which, on the one hand, requires that the evidence for it must provide certainty, or, on the other hand, which prevents there being inductive evidence for it which confers some degree of probability.

So far we have conceived the line of distinction between allowable and not-allowable possibilities as drawn arbitrarily. Now if the distinction were simply arbitrary, we would rightly feel that it has no significance. Can it, then, be other than arbitrary?

It could, if there were a methodical procedure for making the distinction. For we could then say that the distinction has at least the kind of sense which is associated with the employability of such a procedure. And if the procedure were inductive, we could think of the distinction as having objective significance in at least one sense in which one would want to think of a concept as objective, namely, such that statements using it are verifiable by reference to empirically available evidence.

5. *The idea of real necessity is inductively related to observational evidence.* Modern philosophy has been plagued by the incessant opposition between empiricists and rationalists with regard to causal necessity. Empiricists have maintained that necessity occurs only in what Hume called relations of ideas or what the logical empiricists call analytic propositions, so that necessity taken strictly is always tautological. And they have argued that experience never provides us with instances of necessity, so that no inductive generalization can be taken as involving necessary connection. For this reason, those among the empiricists (like Mach and Pearson) who have realized that the classical —and also the ordinary—conception of explanation requires that the fact to be explained be shown as necessitated, have gone on to the consistent conclusion that science is descriptive but not explanatory. Rationalists, realizing that science is explanatory and that without necessity no explanation is possible, and searching for some means whereby necessity can be grasped, have generally maintained that apart from sensation we have a faculty by which we have direct insight into necessary connection. There are variations on this theme of opposition, but the main lines are fairly well defined.

Now if what has been said above is right, there is error on both sides and the truth is to be found somewhere in a synthesis. Explanation is impossible without real necessity; but the history and procedure of science give no reason to believe that rational insight or intuition can serve as the cognitive ground of causal assertion, although it may be useful heuristically in suggesting insights to be tested. On the other hand, it is not true that the only form of necessity is logical and that there is no inductive warrant for assertions of necessary connection. Thus, if there is a species of necessity which we can call "real necessity," if explanatory knowledge (hence science in a strict sense) requires such necessity, and if there is an inductive procedure for grounding assertions of necessity, then the only correct position would be a kind of rational empiricism, namely, a position according to which science seeks intelligible connections, hence necessary con-

nections, which, however, are cognitively founded on observation and experiment and not on any supposed direct, intuitive, or immediate grasp of essential truth.

This view differs from the type of rational empiricism to be found in Kant or in modern methodologists, allowing to necessity a transcendental or methodological but not empirical significance. The ground of the difference lies in the answer to the question whether induction provides a means of deciding on the existence of necessary connections. If the necessity of a connection is always dependent on *a priori* grounds, hence on grounds independent of particular observations, and if the necessity is not analytic, then, of course, it can only be methodological, or conventional, or transcendental (in the Kantian sense), or something equally "subjective." But if not, then we can meaningfully speak of objective necessity, and we are brought out of all forms of subjectivism into a causal realism, the essential position of all classical metaphysics.

It may seem inconsistent to speak of inductive warrant for a necessary connection. If so, this is because the idea of necessity is for some reason thought to be associated with that of certainty. Inductive procedure does not provide certainty in a strict sense. And if necessity involves certainty then inductive procedure can not lead to necessary connection. There does not, however, appear to be any valid reason for associating the two ideas. To be sure, if *A* necessitates *B*, then it is certain that, given *A*, *B* will result. But this certainty is logical, relating premises to a conclusion. It is not a certainty that *A does* necessitate *B*. Equally, there does not appear to be any *a priori* reason why we can not significantly speak of the probability that *A* and *B* are necessarily connected. There is, therefore, no initial inconsistency in contemplating inductive confirmation of a necessary connection. What appears to be an inconsistency is due to a confusion of necessity, a relation of events, properties, etc., with certainty, an epistemological property of sentences, propositions, states of mind, etc.

The general type of inductive problem is of the following sort: (1) We have a finite set of observations or data. This set is taken to be a sample of a larger population. (2) We have to infer from the characteristics of the sample to the characteristics of the population. Many technical problems are involved. But, in general, inductive inference is inference from a sample to a population which it is taken in some way to represent. This holds not only for statistical inductions but for causal inductions as well. For instance, the experimenter makes a hundred observations which, when represented graphically, appear as points in a plane.

From these points he makes an inference to a curve, which represents a causal law. Thus the general problem of causal induction is analogous to the problem of fitting a curve to a finite set of observations. Curve fitting is one type of causal induction.

As we have seen above, the set of points constituting the curve represents the entire set of really possible combinations of coördinate values. Hence in inferring a curve, the scientist infers to a set of real possibilities. When he draws a particular curve, this is tantamount to the assertion that among all the logical possibilities pertaining to the subject, those represented by the points on the curve are the only ones allowed by or available to the subject (a wire, a gas, an organism, the actual universe, depending on the type of law involved). Thus the population to which he infers is a population consisting of real possibilities.

Similarly the sample from which he infers consists of real possibilities. It is true that if he makes an observation, it is an observation of an actuality. But it is not *qua* actual that it is used as an element of the sample. In so far as the scientist seeks a *law,* he is not interested in any specific instance in its actual existence *qua* particular. The particular instance, as observed, does not provide him with the necessary connection he seeks. Hume was right in pointing out that the individual instance does not show, as a perceptual component, necessary connection. Perceptually, it shows only that in this particular case two things occur in conjunction. However, what is an actual fact is also a real possibility. Hence the particular instance shows the scientist one of the real possibilities. Similarly a constant conjunction provides him with a class of real possibilities.

Thus the *specific* form of inductive problem faced by a scientist when he wishes to infer a law from observations is this: (1) He has a finite sample consisting of real possibilities (e.g., values of the variable magnitudes involved). (2) He has to infer from the characteristics of this sample to a total population of real possibilities (e.g., he has to draw a curve). He will have to say: Certain logical possibilities occur in the population, others do not. The statement of which possibilities do and which do not occur in the population is the statement of the law.

There is no essential difference between this and other inductive procedures, as inductive procedures. The difference lies in the type of element included in sample and population. When we infer from a sample of marbles drawn from an urn to the whole set of marbles in the urn, we infer from actualities to actualities. A statement of the composition of the marble population is not, however, a causal law. It is a statement of a specific distribution

of actualities. But when actual observations are treated as indicating real possibilities, and we make an inference to an entire set of real possibilities, we infer to a law. Such an inference goes beyond any set of actualities (or fact of distribution) to a set of real possibilities (or causal fact). In so far as that set of possibilities does not include one or more of the logical possibilities, it affords real necessity.

When the result of an inference to a total set of real possibilities is stated as a law, it appears as the outcome of an induction. As a statement of a set of real possibilities it is a statement of necessity. As the conclusion of an inductive inference it bears some degree of probability on the basis of the sample and method of inferring. Thus the scientist seeks to state a necessity with as high a degree of probability as possible.

It appears from this that inductive procedure makes it possible to distinguish between allowable and not-allowable possibilities in a manner which is not simply arbitrary. So far as logical principles are concerned—that is, so far as empirical evidence has not yet been introduced—every logical possibility is allowed. But when empirical evidence comes into play, providing a sample, it is possible that the population will be judged not to include all the logical possibilities. The sample, together with a method of inferring from it to the population, permits us to make a judgment, with a certain degree of probability, that the population will have a particular distribution or selection of the logical possibilities. In so far as some of the logical possibilities are excluded from the population, there is a division into two sets: those in the population (allowable) and those outside the population (not-allowable). If the not-allowable subset is not empty, a real necessity is asserted.

It also appears that judgments of necessity achieved in this way, as inductively grounded on empirical evidence concerning a distribution of possibilities, are objective in at least one important sense. Since the evidence for them is empirical, and they are reached inductively, they can not be said to be *a priori*. Consequently there is no reason for attempting to interpret them as subjective, as transcendental (in the Kantian sense), or as methodological.

There appears, therefore, to be a complete compatibility between the idea of discovering a law involving necessary connection and the idea of discovering it by inductive method which affords only probability as to its truth. It is no part of the present discussion to consider the nature of the ground of inductive procedure itself. I have wished only to establish the proposition

that *if* inductive procedure has any warrant, *then* laws, involving necessary connection, may be inductively confirmed in no essentially different way from that followed in confirming any inductive generalization. And if this proposition is correct, then an empirical philosophy—which views induction as the only valid method of obtaining positive knowledge of the world—will have to allow for the presence of necessary connection in its conception of the nature of things.

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A NOTE FOR THE PHILOSOPHY OF HISTORY

THE modern scientific historian writing "the new history" feels that he has avoided the pitfalls both of the dogmatic doctrinaire and of the skeptic. This he feels because, having developed something like a scientific method in dealing with the data of history, he is able to be quite impersonal and objective in the selection and organization of events. This belief was developed gradually in recent centuries. Early in the nineteenth century Lord Macaulay in a review of Hallam's *Constitutional History of England* notes the division of the art of writing histories into the art of historical romances and the art of "good historical essays," which he compares to each other as an imaginatively painted landscape to an accurate map. Today this distinction is taken for granted. A modern historian has defined history in this spirit quite simply: "History is what the evidence obliges the historian to believe." Obviously there is no objection to the exacting criteria of the new history or to the exclusion of gratuitous imaginative touches. The only objection is to the uncritical use of these criteria, leading the historian to believe that he is free from human limitations and has achieved a degree of objectivity greater than that which he has, in fact, obtained. Such a failure of self-criticism has prompted in some a devotion to that "ideal of truth which made the whole past generation of historians believe that in archives as such there was salvation."[1] There is reason to believe—and this paper is intended to explore some of these reasons—that this naïve view deserves to die out. Further, a more objective and more adequately defended view of history appears to be possible.

Of course the new scientific doctrine is as full of pitfalls as any other doctrine. Consider the definition, "History is what the evidence obliges the historian to believe," and note the difficulties con-

[1] S. K. Langer, *Philosophy in a New Key*.

tained in only two words: "evidence" and "historian." The word "evidence," to take the first, is ambiguous. There are two kinds of evidence:[2] factual and systematic. Factual evidence is drawn from observed fact, often repeatedly confirmed. Systematic evidence is drawn from the interrelations among facts. A prediction made by a natural science may be made entirely on the basis of systematic evidence (as was the case in the prediction of the Compton Effect in physics). If factual evidence later tallies—in instances where observation can be made—with this prediction, then factual and systematic evidence are at one, and the theory which lies behind both is for the moment secure. Thus the two kinds of evidence work together in the construction of a scientific theory. Now the new history is dominated by the weight which it gives to factual evidence—despite the difficulties of observation—whereas the older theories tend largely to be dominated by systematic evidence. The question is whether the privilege accorded to factual evidence endows the new history with any greater degree of objectivity than other theories might have been capable of.

That these two kinds of evidence are not independent of each other is clear. The degree to which observation is dictated by theory, however poor the theory, is notorious in courts of law. But both judge and lawyer have little respect for the witness's theory. In this attitude toward the witness, judge and lawyer are exemplifying a growing trend of recent times, a trend toward regarding theory as subjective and misleading, hence toward minimizing or even extruding it entirely. This tendency is in harmony with the apparent conviction of recent centuries that the human being is noetically inferior, and compares with the medieval conviction that man was morally inferior. Thus the judge instructs the witness to forget what he thinks he knows about the case and to report, if possible, merely what he *saw*. Even so, the witness's story will probably not survive criticism by the lawyer for the opposition. This human weakness the historian recognizes and attempts to guard against. Hence the historian becomes a trained *observer* of the facts within his particular field. In these terms the question facing us concerns what makes the historian a trained observer: command of a good theory, or deliverance from theory entirely?

We may approach this aspect of the problem by asking just what is meant by the term "historian." Now it is a very real question whether complete extrusion of theory, complete absence of bias, preconception—complete impersonality in other words—is either possible or desirable for any human being to attain to. A perfect historian of this kind would logically attempt to transcribe the

[2] Cf. S. C. Pepper, *World Hypotheses: A Study in Evidence*, Berkeley, 1942.

temporal continuum entirely without additions or omissions. But such a transcription of the continuum would be merely a repetition of the course of events. It would cast no new light upon the succession of events and thus would fail to fulfill its function as history. Any historian must have some interest, some value system, which signalizes facts of one kind to be more significant than facts of another kind. Possession of this standard of historical value is just what distinguishes the trained observer. The historian is expert in collecting and synthesizing relevant and valuable evidence. To acknowledge this is to agree that evidence makes sense only in a system. One finds the sort of thing which he is looking for, otherwise he would not know where to begin to hunt. The historian's hypothesis about the events directs him where to look for facts. Now clearly the hypothesis is not another fact; it is something which the historian contributes to the facts which he selects as the means for organizing them. But the precise nature of the relation between the hypothesis and the facts is notoriously difficult to describe. One writer is content to conclude that the historian's "'view' as it takes shape must be a dialectic between his sense of pattern and such evidence as he can find."[8] The important point to note here is that the historian's "sense of pattern" is an essential ingredient of his final product.

Further one's hypothesis about the facts together with the effort to find them have subtle effects upon the very facts themselves which are thus isolated out of the continuum. This is recognized by the biologists who admit that they "murder to dissect." Also in modern microscopic physics it is becoming agreed that the distinction between phenomenon and observer is less clear than it was formerly believed to be. Heisenberg's famous principle may be interpreted to mean that in general the processes necessary to observe a phenomenon affect the phenomenon to an indeterminable degree. Similarly in epistemology the early realistic point of view assumed that the knowing subject confronted an unambiguously external world. It was realized, though, that if this theory were true there would be no way of checking it, for any check would be an internal phenomenon. Thus the external world was seen, on this theory, to be forever unattainable. Inevitably a theory of knowledge which separates the knower so radically from the known will become its own victim. In consequence the knowing subject and the known object began insensibly to merge, and this older concept of objectivity lost its specious clarity. Facts can no longer be regarded as the clear-cut, invariable, impersonal entities which they were once thought to be. The knower is inextricably involved

[8] D. Emmet, *The Nature of Metaphysical Thinking*, Macmillan, 1946.

in the facts he cognizes;[4] his personal bias is always a factor in his conclusions.

One can not but admit, in the face of these developments, that the historian is an important factor in the history which he writes. His hypotheses, sense of pattern, his unconscious biases, his techniques of fact-finding and synthesis are impalpably omnipresent in his writing. Any good theory about history and historical objectivity must take account of these as well as of more obvious factors. Any history is partly an autobiography of the historian and his own doctrines. Accordingly, any history is to some extent doctrinaire history. The distinction between the older history and the new scientific history is not absolute in this respect, but is relative to the greater weight given to facts and the greater readiness to entertain alternative hypotheses which qualify modern doctrines of history.

The fact is that the skeptic in one respect has a good argument; the modern historian is not the only one who can call himself objective. There are many kinds of objectivity, and each has a great deal to say for itself. This fact is becoming recognized. One historian of growing reputation shows an obvious impatience with "would-be scientific impersonal explanations" in history and suggests that the historian "like each and all of us, is more or less the slave of historical relativity."[5] The next question which this historian would indicate—a question which the skeptic might not deign to recognize—is which of these kinds of objectivity is most objective. A specific doctrine of history obviously is not in possession of the criteria required for answering a general question of this kind. Exactly at this point one must pass beyond history to the philosophy of history. An important function of a philosophy of history, then, is to develop the argument which clarifies and defends the particular type of objectivity which a given historian achieves.

In sum, the measure of objectivity attained by any particular kind of history involves two dimensions: the technically historical, and a philosophical dimension. Historical objectivity is attained in the first place by success in a way of selecting and organizing the facts according to a particular technique, say Augustine's, Hegel's, Toynbee's. But in the second place this way of selecting and organizing the facts is relative to a doctrine of historical objectivity and as such can not be justified or defended by history alone. A philosophy of history defends a particular way of dividing the his-

[4] For other variations on this point see W. H. Werkmeister, *The Basis and Structure of Knowledge*, Harper, 1948, pp. 69, 141, 341, et al.

[5] A. J. Toynbee, *Civilisation on Trial*, Oxford, 1947, p. 16.

torical continuum. In other words it mediates between the historical continuum (from which the problems and facts are drawn) and the discrete component (which is the solution to the problems in terms of an organization of facts). Thus the historian is the measure of events, but he is an adequate measure only to the extent that he can defend the objectivity of his method. This defense involves recognition of the inescapable element of personal bias, the historian's own contribution to the facts, together with an explanation of this contribution as being in harmony with something other than the historian's own caprice. It seems, in short, that the very personal bias which neither the historian nor anyone else can escape, can nevertheless be moulded by education and hence can be defended as beyond caprice or childish whim. If one's bias can not be erased, it may be recognized, directed, and defined in terms of its agreement with notions of order and reality which transcend any particular historical technique. Traditionally this kind of direction and defense has proceeded by considering questions about the whole of history. What is historical fact, historical order? Does history proceed along a straight temporal line, or is there a rhythm, a repetition of types of events? Is history a mere succession of events? Or is it a succession with a direction? And there are other questions. The answer to these questions provided a measure of the historian's personal bias and made it possible to defend his personal views in terms other than those of "taste" or "caprice." Today as often as not it is the fashion among some empiricists to exclude philosophical questions on the ground that they are unanswerable. And indeed they are unanswerable in empirical terms, but it does not follow that they are unanswerable in any terms. Further, only to the extent that philosophical questions are dealt with successfully can the objectivity of even the empirical criteria be defended. The modern "scientific history" is one doctrine among others, and those interested in employing and preserving it must needs know how to take its philosophic measure as well as its technical measure.

It is clear why a historian has not been considered fully capable of pursuing his calling until he has become a doctor of philosophy. The relation of the continuous to the discrete in history as in any other study is a subtle almost indefinable relation. When training in managing these concepts is inadequate, one quickly sees the results. Either the student becomes a victim of the over-optimistic scientism which holds that the continuum is naturally and obviously divided into ready-made facts which one can easily observe if only he be trained to use his vision undisturbed by personal bias; or, on the other hand, he falls victim to skepticism, the conviction that

the continuum is divisible according to anyone's bias and hence that objectivity is unattainable. The journey of the student always lies along the narrow way between these two quicksands. The philosophic part of any study is the safeguard against falling into them.

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BOOK REVIEW

A la lumière du matérialisme dialectique. Vol. I. *Logique formelle, logique dialectique.* HENRI LEFEBVRE. Paris: Editions Sociales. 1947. 291 pp. 225 fr.

Most expositions of dialectical materialism deal with so many questions—logical, physical, psychological, political, and economic—that the strictly logical questions tend to be obscured. Dr. Lefebvre has wisely decided to devote the first volume of his series to a more specific subject: the relations between formal and dialectical logic, and to leave it to the specialists who will write the other seven volumes of the series, to deal with scientific method, historical materialism, sociology, socialist humanism, ethics, psychology of personality, esthetics, and other themes.

Both in his criticism of formal logic, and in his exposition of dialectical logic, Dr. Lefebvre follows Hegel, or rather, Hegel as revised by Engels and Lenin; but he has organized the whole subject and added many reflections of his own, particularly anent recent developments of science and philosophy. The criticism of the theories of Bergson, Boutroux, Meyerson, and Lachelier (*Fondement de l'induction*), which enjoy great prestige and authority in France, helps to explain why dialectical materialists go on repeating the same very general principles of ontology and method without much variation or development. The metaphysical dogmatism, the doctrines of immediacy or skepticism, to which they objected in the past, also flourish today, only slightly varied, and still represent in their eyes a danger to science and progress.

The laws of dialectic which Dr. Lefebvre states at the end of his book are "universal" inductive principles, derived from scientific experience. In themselves they never permit the deduction or prediction of any event, but constitute rather the framework or guide to concrete scientific inquiry.

(1) The first is the law of universal interaction (or interconnection, or reciprocal "mediation"), of all that exists (p. 221). The

practical maxim implied is that, though isolation is a fertile and necessary method, it must always be remembered that the result is an "isolate," to use H. Levy's expression, only partially and artificially detached from its context. An exemplification of this law, emphasized throughout Lefebvre's book, is the reciprocal mediation of abstract and concrete. Although the concrete is the true, it is at first unknown, and must be determined by thought which is relatively abstract (p. 155). The abstract, in turn, is empty and meaningless unless realizable in the concrete. The metaphysical complacency which rests content with unanalyzed immediacy is as bad as the metaphysical dogmatism which stops short with abstractions, and declines to verify or realize them in the concrete.

(2) The law of universal movement also points to the interrelatedness of things. The movement and developmental processes internal to a thing and those external to it must be investigated in their interconnection.

(3) The law of the unity of contradictories calls attention to the tensions and "contradictory" forces internal to systems. "Contradiction" in this sense the author has distinguished (though not very clearly) from formal contradiction.

(4) The law of the transformation of quantity into quality is obvious to most philosophers. It emphasizes the limits of mechanism, but also the absurdity of rejecting quantity (Bergson), and it insists upon the reciprocal relations of these categories.

(5) The law of spiral development (often called the negation of negation) states that the path of development is not circular but spiral. Behind the equilibria and cycles of history are historical trends.

Dr. Lefebvre gives a good account of these traditional laws. His insistence that they are both "universal and concrete," however, is confusing. They are certainly not concrete in any usual sense, and their universality is not always obvious, and need not be maintained. His use of the term "contradiction" not only in the strict logical sense, but also to describe contrary forces or tendencies, also seems unnecessary.

Before embarking on a critique of formal logic, Dr. Lefebvre comes to terms with the metaphysics with which logic has become associated. Metaphysics, he says, is thought which separates what is connected. It absolutizes some part of the knowledge thus far acquired, and makes it mysterious, eternal, and autonomous (p. 19). Abstraction, however, is only legitimate when it is employed as a means or intermediate stage of inquiry into the real (pp. 83–84). Because metaphysics abstracts from empirical or historical knowl-

edge, many of its problems are artificial. Thus Kant raised the questions: How is knowledge possible? How are mathematical science and its applications possible? etc. In the name of our practical and historical knowledge, Lefebvre replies: "How is metaphysics possible?" (p. 20).

As science advances many metaphysical questions disappear: The "problem" of knowledge is replaced by a *theory of knowledge*, the word "theory" being taken in a sense close to the scientific usage. This theory of knowledge can only be a *history of knowledge*, which is subdivided into several chapters as follows:

(a) History of the sciences and their particular methods.
(b) History of the general forms, methods, and instruments of knowledge; their *mise au point* in the actual conditions of human knowledge, and
(c) Social history of ideas. Logic is mainly concerned with the second chapter.

The author's attitude toward formal logic is twofold. He admits that it is a valuable preparatory discipline, the partial truth of which is retained even by dialectical logic. To carry on a conversation, for example, you must assume that $A = A$, though if the conversation bears fruit, A is apt to turn into non-A. Even the dialectician must grant a limited validity to the laws of identity, non-contradiction, and excluded middle. Identity and non-contradiction are, in fact, quite essential to the dialectical movement. If contradictories, for example, were not incompatible, how could one say that they must be overcome (*aufgehoben*)? On the other hand, the author insists upon the shortcomings of formal logic. He argues, for example, that $+A$ or $-A$ assumes an A which is neither, and he claims that the syllogism in Barbara is circular; but these contentions have been put forward before by Hegel and others and do not perhaps require discussion. Dr. Lefebvre, however, advances a more interesting argument when he charges that the relations of contraries are not formal: If you assume that the A proposition is true, he says, you can infer the falsity of E, but if you assume, as is quite permissible, that the A is false, you can not infer the truth of B. Thus logical determination in this case is subjective, i.e., depends upon whether you start off assuming truth or falsity (p. 125). This asymmetry, the author suggests, represents a breach in the structure of formal logic, which can be remedied only by an appeal to fact. Symmetry could be preserved, of course, but the resulting logic would not agree with our experience.

Logistic is also criticized. Lefebvre argues, for example, that since atomic propositions in *Principia Mathematica* admittedly can

only be established empirically, it is the fate of the calculus to continually refer to facts. The answer is that such propositions are not asserted in the system. On the other hand, Russell acknowledges that the hierarchy of classes does oblige us to assume the existence of at least one thing.

The most serious complaint is that, in practice, formal logic tends to sterilize thought. Form alone becomes important and meanings, which in fact change as the world changes, become in use fixed and stereotyped. The author, who continually has the practical importance of logic in mind, would like to see it better integrated into the inductive process—the hypothetico-deductive-confirmatory process, where its content would be subject to constant review and correction.

It has been possible to refer to only a few of the many topics briefly discussed in this book. The criticism of Bergson, Boutroux, and Lachelier is effective. Lachelier's view that only an extra-natural force could assure the uniformity of nature was vulnerable enough. On the other hand, Lefebvre does not himself deal with Hume's problem, and his definition of the cause of a phenomenon as "the whole world in the process of becoming" (p. 178), is very impractical. There is no apparent reason to assume that the problem of induction or the contradictions arising from reflexivity in *Principia Mathematica* could be avoided by the use of dialectic. The contradictions of non-dialectical philosophers are of no aid to dialectic unless it can solve them.

Other criticism of the book could be expressed. It is more important, in concluding, to acknowledge its merits, and to recommend it to readers who will profit by the clarity and breadth of its exposition. It is probably the best book ever written on the logic of dialectical materialism.

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BOOK NOTES

Gioberti. LUIGI STEFANINI. (Storia della filosofia italiana, 18.) Milano: Bocca. 1947. 440 pp. 600 lire.

In this collection of monographs on Italian philosophers, edited by Professor Sciacca, the volume on Vincenzo Gioberti has a relevant place. Gioberti was indeed one of the most typical Italian thinkers. His political and historical bent recall to our mind Campanella and Vico. His effort to preserve for both sensation and

reason their full epistemological value is a result of the typically Italian respect for hard facts, led and directed by that basic bent towards rationalization which is peculiar to Latin peoples. Gioberti (1801–1852) had a paramount importance in the movement of ideas of the Italian Risorgimento although his figure is somewhat eclipsed in the popular estimation by the more brilliant and romantic figure of Mazzini. His political theories arose from his conception of the history of Europe and the world: as the Pope is head of Christendom and his historical seat is in Italy, Italy is in fact the first nation of the world, the lighthouse of universal civilization.

Gioberti, like Fichte, shows that the dividing line between patriotic feeling and imperialistic nationalism is a very slender one. When their countries were still dominated by foreign rulers, they claimed not only independence for their country but also universal, if only spiritual, predominance, basing this claim on a metaphysical system. The interplay of political action and philosophical meditation in Gioberti's life was particularly impressive. He wavered often between republic and monarchy, between an orthodox conception of Christendom and a pantheistic or symbolistic interpretation of religion. But he was, or believed himself to be, a true democrat throughout his life, a champion always of freedom as opposed both to absolute monarchy and to the demagogic rule of the mob. Even concerning the future constitution of Italy his point of view was reasonable. As Italy was, and had been, divided for long centuries into a number of small states, he thought this regional arrangement should be preserved by a confederation of states under the spiritual leadership of the Pope.

These ideas were expressed in his famous work on the moral and social primacy of the Italian people (1843). Gioberti in exile wrote his greatest political work, the *Rinnovamento,* in which he proposed a new line of policy for Italian independence and liberty under the leadership of Piedmont with the help of France. He died a few years after the appearance of this book, while his new program was more or less followed and brought to fulfilment, some eight years later, by Cavour.

It would be interesting to detail the influence on Gioberti (as on other "fathers of the Risorgimento") of Machiavelli's insistence on "factual reality," on real conditions as a basis for any political program. Although his theories seem far-flung, Gioberti tried always to base them on observation of real facts, just as in his philosophy he tried to account for the part of sensation as well as of reason in our knowledge. On the other hand he felt intensely the difference between the two modes of knowing, that "chasm" which Kant tried to fill by his schematism. An imperfect knowledge of

Kant and the influence of Rosmini brought Gioberti to endeavor to fill this "chasm" by a third form of knowledge (intuition) by which we have an immediate idea of being in general. Being as such is at the same time "psychological," i.e., being as known, and ontological, i.e., being subsisting. This absolute being binds together contingent being as given by sensation and necessary being as known to reason. As propositional judgment (cf. Kant) is the proper form of our knowledge, this connection needs to be known and expressed as a proposition which he calls the "ideal formula" (Gioberti maintains a fundamental identity of thought and language): *"L'Ente crea l'esistente"* (necessary being creates contingent being). On the other hand our knowing, by unifying sensations (cf. Kant again) under intellectual forms, produces a second cycle of the "ideal formula": *"L'esistente ritorna all'Ente"* (contingent being returns to necessary being). The two formulas are the counterpart or expression of theological truth, of creation and redemption.

Certainly Gioberti was not a consistent thinker or even a thinker of the first order. But both his political and philosophical influence on Italian culture can hardly be overrated, and Professor Stefanini should be praised for his labors devoted to Gioberti's life and thought.

His essay is divided into two parts: the first one describes Gioberti's life and the development of his thought, the second one gives a systematic exposition of his philosophy. The two parts clash: if the thought of a philosopher follows successive steps no step should be considered as definitive and therefore no systematic expositior of the ideas of a thinker can fully express what he thought and was. The first part of Professor Stefanini's work uses in full the great number of Italian studies, monographs, essays, etc. on Gioberti's life and thought. It is sound, although second-hand, information, and it is well ordered although too often leaning toward an apologetic defence of Gioberti, and giving rather a lifeless catalogue of writings, facts, and ideas than the living image of an abundant, enthusiastic mind. The second part is rather puzzling and inconclusive, and it is written in a redundant, inflated style from which no clear idea of Gioberti's philosophy (or rather, of Professor Stefanini's conception of Gioberti's philosophy) can be elicited.

M. M. R.

Introduzione alla psicologia. AGOSTINO GEMELLI, GIORGIO ZUNINI. Milano: "Vita e Pensiero." 1947. 430 pp. 900 lire.

Father A. Gemelli, Professor of Experimental Psychology and Rector of the Catholic University of the Sacred Heart at Milan, re-

capitulates in this volume the general results of a long life of scientific research. He is the only surviving member of that galaxy of Italian scientists who in the first years of this century gave Italy a leading position in the field of psychiatry, experimental psychology, and cognate subjects.

From a veteran of an older tradition, from a keen polemicist who in his younger years fought unrelentingly Haeckel and Lombroso and other leaders and theories of positivistic biology and psychology, one might have expected an attitude of absolute opposition towards the latest, materialistic psychological schools. On the contrary the first merit of this book is its critical balance. Father Gemelli does not reject any theory on the basis of general principles. He subjects to the same earnest inquiry even behaviorism and psychoanalysis and many other extreme schools, and judges them on their merits, always allowing for their real contribution to psychological studies. Father Gemelli insists on the absolute independence of psychology both from philosophy and from biology, and shuns any relation with metaphysical dogmatism.

The book is not a handbook—Father Gemelli's scientific contributions to psychology are so various and ample as to make it impossible to give them proper space even in a large volume. This is in fact an "introduction," a general survey of methods and principles in the whole field of psychology, focussing as it were the results of scattered researches and experiments on definite statements on the principal problems of psychology.

Father Gemelli enhances the importance of the latest discoveries and his evaluation of the positive contribution of contemporary psychologists is clear and authoritative. He gives indeed an encyclopedic account of psychological schools and researches in the last seventy years. Of course this very unpreconceived outlook and avoiding of philosophical issues makes one doubt whether one should avoid a clear metaphysical decision in a methodological treatise. For instance, introspection and experiment are both praised by Gemelli as two necessary procedures of psychology which should run parallel, so as to escape the basic doubts which arise from the double source of psychological facts. On the other hand the fair judgment on Gestalt-psychology and on modern characterology (to quote only two outstanding examples) proves the penetrating quality of Father Gemelli's analysis and his ability in bringing his ample experience and his experimental skill to bear on difficult problems so as to reach a conclusion which may be considered, if not definitive, the most probable at the present stage of psychological research.

M. M. R.

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